

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
4 January 2001 (04.01.2001)

PCT

(10) International Publication Number  
WO 01/00141 A1

(51) International Patent Classification<sup>7</sup>: A61K 7/00, 7/06, 7/48

(21) International Application Number: PCT/EP00/05109

(22) International Filing Date: 2 June 2000 (02.06.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 09/344,014 25 June 1999 (25.06.1999) US

(71) Applicant (for AE, AU, BB, CA, CY, GB, GD, GH, GM, IE, IL, KE, LC, LK, LS, MN, MW, MZ, NZ, SD, SG, SL, SZ, TT, TZ, UG, ZA, ZW only): UNILEVER PLC [GB/GB]; Unilever House, Blackfriars, London EC4P 4BQ (GB).

(71) Applicant (for all designated States except AE, AU, BB, CA, CY, GB, GD, GH, GM, IE, IL, IN, KE, LC, LK, LS, MN, MW, MZ, NZ, SD, SG, SL, SZ, TT, TZ, UG, ZA, ZW): UNILEVER NV [NL/NL]; Weena 455, NL-3013 AL Rotterdam (NL).

(71) Applicant (for IN only): HINDUSTAN LEVER LIMITED [IN/IN]; Hindustan Lever House, 165/166 Backbay Reclamation, Maharashtra, Mumbai 400 020 (IN).

(72) Inventors: MA, Zhuning; Unilever Home & Personal Care USA, 3100 East Golf Road, Rolling Meadows, Chicago, IL 60008 (US). NEILL, Paul, Howard; Unilever Home & Personal Care USA, 3100 East Golf Road, Rolling Meadows, Chicago, IL 60008 (US). BRANDT, Loralei, Marie; Unilever Home & Personal Care USA, 3100 East Golf Road, Rolling Meadows, Chicago, IL 60008 (US). SCAFIDI, Anthony, Aloysius; Unilever Home & Personal Care USA, 3100 East Golf Road, Rolling Meadows, Chicago, IL 60008 (US). NOGAJ, Bozena; 1750 McCarthy Road, Apt. 10, Appleton, WI 54915 (US). NEWELL, Gerald, Patrick; Unilever Home & Personal Care USA, 3100 East Golf Road, Rolling Meadows, Chicago, IL 60008 (US).

(74) Agent: GRIFFITHS, Helen, Sarah; Unilever PLC, Patent Dept., Colworth House, Sharnbrook, Bedford, Bedfordshire MK44 1LQ (GB).

(81) Designated States (national): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— With international search report.  
— Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 01/00141 A1

(54) Title: PERSONAL CARE COMPOSITIONS AND METHODS-HIGH INTERNAL PHASE WATER-IN-VOLATILE SILICONE OIL SYSTEMS

(57) Abstract: A composition which is: a) a hair care composition which is a high internal phase water-in-oil emulsion which comprises: (I) an oil phase which further comprises i). a mixture of non-volatile and volatile silicone oils, and ii.) a silicone surfactant; and (II) which comprises an aqueous phase; and which substantially lacks a fatty alcohol; and b) a skin care composition which is a high internal phase water-in-oil emulsion which comprises: (I) an oil phase which further comprises i.) a mixture of non-volatile and volatile silicone oils, and ii.) a silicone surfactant; and (II) which comprises an aqueous phase.

- 1 -

**PERSONAL CARE COMPOSITIONS AND METHODS- HIGH INTERNAL  
PHASE WATER-IN-VOLATILE SILICONE OIL SYSTEMS**

5

**BACKGROUND OF THE INVENTION**

Typical hair conditioning products are usually based upon a cationic surfactant, generally a quaternary ammonium 10 compound and fatty alcohol. This combination results in an oil-in-water lamellar gel-network that provides the formulation with a thick creamy rheology/viscosity. However, while such traditional compositions deliver 15 conditioning benefits to the hair, the fatty alcohols and quaternary components also deposit onto the hair and continually build-up with each usage, making the hair look and feel weighed down and greasy.

The present invention is directed to a vehicle to deliver 20 beneficial components to the hair and skin. The product forms for hair include leave-on or rinse-off conditioners, shampoos, hair color, and styling aids. The product forms for skin include leave-on or rinse-off skin care products such as lotions and creams.

25

The following are publications relating to this field of technology:

5 U.S. PATENT DOCUMENTS

U.S. 4,311,695; U.S. 4,122,029; U.S. 4,268,499; U.S.  
4,218,250; U.S. 4,151,204;  
U.S. 4,057,622; U.S. 5,534,246; U.S. 4,499,069; U.S.  
10 4,784,344; U.S. 4,948,578;  
U.S. 5,216,033 and U.S. 5,587,153. .

FOREIGN PATENT DOCUMENTS

15 EP 0,435,483; EP 0,271,925 and JP 7-165529

SUMMARY OF THE INVENTION

0 The present invention is a high internal phase water-in-oil emulsion. High internal phase water-in-oil emulsions are defined as having greater than about 80% dispersed aqueous phase. The internal phase is defined as the non-continuous aqueous phase component of the emulsion. When compared to 25 traditional oil-in-water conditioners, the hair is not weighed down as much by compositions of the present invention because fatty alcohols are not present in and are not deposited by the present hipe w/o formulations. The hipe water-in-oil conditioners thus leave the hair with a greater amount of 30 natural volume, bounce and body. Previous water-in-oil emulsion systems known to those in the art of formulating hair

- 3 -

and skin care products typically have dispersed water phases less than 80%. By contrast, the hipe water-in-oil emulsions systems of the present invention tend to deposit less silicone oil on the hair surface leading to improved rinsing and less 5 greasiness and better overall dry hair aesthetics.

The present high internal phase water-in-oil emulsions (hipes) show superior aesthetic properties on skin by releasing the silicone oil more readily when compared to previous lower-10 internal phase water-in-oil systems (lipes), thereby giving the impression of easier spreading and quicker absorption on the skin surface. Hipes can be utilized for easier application and absorption when compared to lipes.

15 In the case of skin or hair leave on products, an ideal composition for the delivery of a topically-active compound to the skin or hair would be one that delivers the topically-active agent such that it adheres to the skin or hair while the topically-inactive ingredients evaporate or are removed from 20 the site. Topically delivered active compounds, such as topical medicines or skin care compounds, have conventionally been formulated as either oil-in-water emulsions or water-in-oil emulsions. However, prior topical compositions prepared as these emulsions typically felt wet, sticky and tacky when 25 applied to the skin substrate. Topical effective compositions should preferably possess the properties of smoothness, non-oiliness, and non-tackiness. In addition, the topically effective compositions should not have a wet feel. Therefore, it would be desirable to provide aesthetic benefits for non-30 greasy, non-sticky, non-wet feeling in topically effective

- 4 -

compositions. The hipes can be utilized with sunscreen or anti-wrinkle agents or reactive agents.

A second disadvantage of typical hair and skin emulsion compositions is the complex preparation methods. The method traditionally requires high processing temperatures, and a series of heating or cooling steps. By contrast, the present invention, is prepared by a simple process without heating or cooling. The invention can also be made clear through the simple technique of refractive index matching. The present invention provides topically effective compositions which overcome the above-described difficulties and disadvantages of prior hair and skin emulsion compositions.

15

The present invention is directed to providing lotion or gel-type topically effective compositions, which exhibit these consumer acceptable aesthetic properties as well as functional properties.

20

The present invention also is suitable for application to skin as a lotion, cream or gel and may also contain topically active components such as but not limited to ultraviolet absorbers (sunscreens) or alpha hydroxy acids.

25 The present invention also addresses improving upon the oiliness or greasiness of such products through the use of the high internal phase inverse water-in-oil emulsions. For example, in U.S. 5,216,033 and EP 435,483 A2, Pereira described examples of water-in-silicone skin care lotions.

30 However, these prior formulations were more difficult to

- 5 -

spread, felt more greasy, had greater residue and were more difficult to absorb into the skin (See Table 5).

5 BRIEF SUMMARY OF THE INVENTION

The invention is directed to a topical composition selected from the group consisting of:

A.) A hair care composition which is a high internal phase  
10 water-in-oil emulsion which comprises:

(I) an oil phase which further comprises

(II) i.) a mixture of non-volatile and volatile silicone oils, and ii.) a silicone surfactant; and

15 (II) which comprises an aqueous phase;  
and which substantially lacks a fatty alcohol; and

B.) A skin care composition which is a high internal phase  
20 water-in-oil emulsion which comprises:

(I) an oil phase which further comprises i.) a mixture of non-volatile and volatile silicone oils, and ii.) a silicone surfactant; and

(II) which comprises an aqueous phase.

25 More specifically, the present invention is directed to a hair care or skin composition which is a high internal phase water-in-oil inverse emulsion having improved efficacy, and to methods of using the high internal phase emulsion compositions.

30 More particularly, the present invention is directed to a high internal phase water-in-silicone oil emulsion comprising a continuous external oil phase and an aqueous internal phase.

The continuous oil phase contains a silicone surfactant, and volatile and non-volatile silicone oils. The internal aqueous phase comprises water.

5

The compositions of the present invention comprise a high internal water phase emulsion, with a non-volatile silicone and a volatile, hydrophobic component suitable for application to either hair or skin. In particular, the present invention relates to hair and skin compositions comprising a high internal water phase emulsion which comprises: (1) less than about 20% of a continuous oil phase comprising (a) silicone surfactant or mixtures thereof; (b) a volatile oil and (2) at least about 80% of an aqueous internal phase and methods of treating the hair or skin.

It is the objective of the present invention to provide personal care compositions, having lower levels of oil phase, that offer advantages for both skin and hair care. The advantages for rinse-off hair care products include the ease of rinsing and leaving the hair with more of its natural body. Advantages for leave-on hair products and skin care products include less heaviness, less greasiness, less sticky and less tacky feel and leaving the hands free of residue when compared to typical water-in-oil skin formulations.

By utilizing low levels of silicone surfactant and very volatile dimethicones, the formulations of the invention have

- 7 -

been able to overcome the difficulty of rinsing out the formulation from the hair.

High internal phase emulsions (HIPEs or hipes) may also be utilized in styling type leave-in products alone or in combination with polymers (DMAEMA, etc.) or structuring compounds (cellulosics, polysaccharides), etc. in order to provide control and hair manageability with a very clean, natural feel (nonsticky).

10 High internal phase emulsions (HIPES) may also be utilized in various shampoos, curling (straightening) or oxidative products along with the appropriate surfactants or reactive agents, respectively without resoiling and debodifying effects of fatty 15 alcohol compounds. High internal phase emulsions (HIPES) may also be utilized in skin care products such as lotions, wrinkle cream and sunscreens. The preparation and use of such products would be by methods materials known in the art or analogous to those known methods and materials.

20 An idea behind using a HIPE as an Extra Body Conditioner is that very little material is left behind on the hair to weigh it down after rinsing. By using a low level of silicone surfactant in combination with a dimethicone having a boiling point about that of room temperature (0.65cts) and a dimethicone of slightly higher viscosity for conditioning, the compositions of the invention rely as much on evaporation as rinsing for removal from the hair after conditioning.

30 The invention also comprises a method of treating hair which comprises contacting said hair with a composition of the

- 8 -

invention. The invention also comprises a method of treating skin or the underarm which comprises contacting the skin or underarm with a composition of the invention.

5

DETAILED DESCRIPTION OF THE INVENTION

As used herein % means weight % unless otherwise noted. When it is said herein that a composition substantially lacks fatty alcohol, this means that said composition has less than about 1% fatty alcohol. Compositions of the invention may be made with known starting materials or with starting materials that can be made by known methods. Compositions of the invention can be made by known methods or by methods which are analogous to known methods.

High internal phase water-in-oil emulsions (hipes) may be utilized in styling type leave-in products alone or in combination with polymers or structuring compounds in order to provide control and hair manageability with a very clean, natural, nonsticky feel. High internal phase water-in-oil emulsions (hipes) may also be utilized in various shampoos, conditioners, styling, curling, waving, straightening, coloring, or oxidative products along with the appropriate surfactants or reactive agents, respectively without the resoiling and debodifying effects of fatty alcohol compounds and without waxy feel upon the hair.

The internal or aqueous phase can comprise from about 80% to about 95% of the composition, or more preferably from about 85% to 90%. The invention also comprises a method of

treating hair which comprises contacting said hair with a composition of the invention.

As noted above in the present invention, the compositions 5 have both high viscosity and opacity through the use of a high internal phase water-in-oil emulsion. These compositions deliver conditioning agents onto the hair.

Another aspect of the invention is to provide a method of 10 treating the hair to yield well-conditioned hair having esthetically pleasing physical properties by contacting the hair with an opaque conditioner of the present invention. Another aspect of the invention is to provide a conditioning 15 composition that is easy to rinse from the hair. The compositions of the invention are easy to rinse from the hair due to the presence of either volatile silicones, polymers, surfactants or other compounds which may alter the deposition upon the hair.

20 The invention is directed to a topical composition selected from the group consisting of:

A.) A hair care composition which is a high internal phase water-in-oil emulsion which comprises:

25 (I) an oil phase which further comprises i.) a mixture of non-volatile and volatile silicone oils, and ii.) a silicone surfactant; and  
(II) an aqueous phase; and which substantially lacks a fatty alcohol; and

30 B.) A skin care composition which is a high internal phase water-in-oil emulsion which comprises:

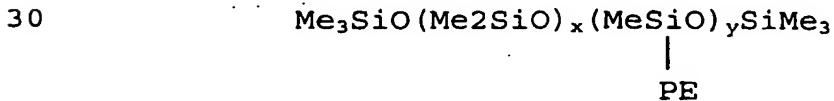
- 10 -

- (I) an oil phase which further comprises i.) a mixture of non-volatile and volatile silicone oils, and ii.) a silicone surfactant; and
- (II) an aqueous phase.

5 Ingredients that are used in the preparation of compositions of the invention are now described.

Q0 Silicone Surfactants

Exemplary of the silicone surfactants or emulsifiers that are used in compositions of the invention is a dimethicone, which is a dimethylsiloxane polymer having polyoxyethylene and/or polyoxypropylene side chains, such as DOW CORNING 15 3225C and 5225C FORMULATION AID, available from Dow Corning Co., Midland, MI, SILICONE SF-1528, available from General Electric, Waterford, NY, ABIL EM 97, available from Goldschmidt Chemical Corporation, Hopewell, VA and SILWET<sup>TM</sup> series, available from OSI Specialties, Inc., Danbury, CT. 20 The dimethicone copolyol has about 15 or fewer ethylene oxide and/or propylene oxide monomer units, in total, in the side chains. Dimethicone copolyols conventionally are used in conjunction with silicones because the oil-soluble, 25 silicon-based surfactants are extremely soluble in a volatile or a nonvolatile silicone compound, are extremely insoluble in water. These products have the following general formula:



- 11 -

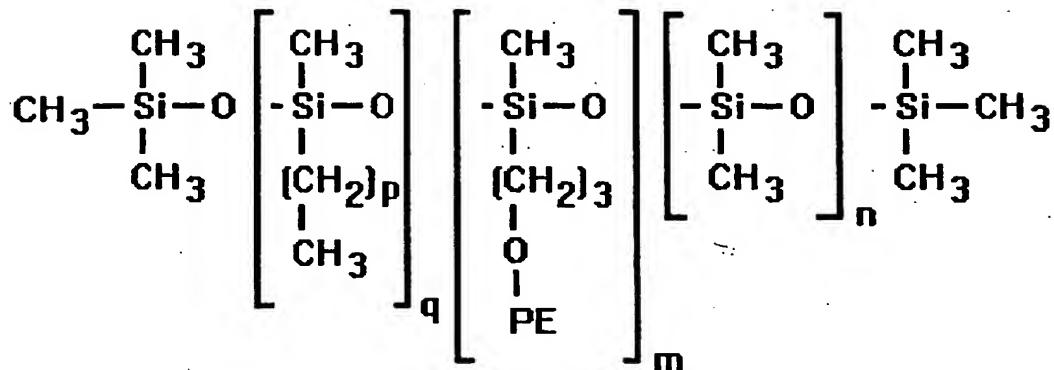
where PE=  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{O}(\text{EO})_m(\text{PO})_n\text{Z}$

In this formula, Me represents methyl, EO represents ethyleneoxy, PO represents 1,2-propyleneoxy, x and y are 1 or greater, m and n can be 0 or greater, however the molecular weight of the PE unit must be greater than 1000, and Z can be either hydrogen or a lower alkyl radical.

Suitable silicone surfactants for use in compositions of the invention are disclosed in U.S. Patent No. 4,122,029 to Gee.

Another exemplary, but nonlimiting, oil-soluble, silicon-based surfactant is an alkyl dimethicone copolyol, such as cetyl dimethicone copolyol available commercially as ABIL EM 90 from Goldschmidt Chemical Corporation, Hopewell, VA. The alkyl dimethicone copolyols have the structure:

- 12 -



5       wherein p is a numeral from 7 through 17;  
 q is a numeral from 1 through 100;  
 m is a numeral from 1 through 40;  
 n is a numeral from 0 through 200; and  
 PE is  $(\text{C}_2\text{H}_4\text{O})_a(\text{C}_3\text{H}_6\text{O})_b\text{-H}$  having a molecular weight of about  
 10 250 to about 2000, wherein a and b are selected such that  
 the weight ratio of  $\text{C}_2\text{H}_4\text{O}/\text{C}_3\text{H}_6\text{O}$  is from 100/0 to 20/80.

15       Volatile Silicone Oils which are included in compositions of  
the invention

The silicone oil phase of the compositions of the invention comprises a mixture of a volatile silicone oil, and a nonvolatile silicone oil. Exemplary volatile silicone 20 compounds include, but are not limited to, volatile, low molecular weight polydimethylsiloxane compounds. They can be either a linear or a cyclic polydimethylsiloxane compound

- 13 -

having a viscosity from about 0.5 to about 10 cst (centistokes). The preferred linear polydimethylsiloxane compounds can have a viscosity range from about 0.5 to 10cst. The preferred volatile polydimethylsiloxanes have a 5 viscosity in the range of about 0.5 to about 6 cst.

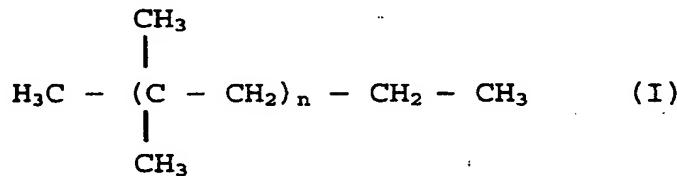
The cyclic, volatile, low molecular weight polydimethylsiloxanes, designated in the CTFA Dictionary as cyclomethicones, are the preferred siloxanes used in a 10 composition of the present invention. The cyclic volatile siloxanes can be either D4, D5 or D6, and mixtures thereof); boil at atmosphere pressure at from about 35 °C to about 250 °C. The polydimethyl cyclosiloxanes having an average of about 4 to about 5 repeating units per molecule are 15 especially preferred. Suitable cyclomethicones are available commercially under the trade names DOW CORNING 244 Fluid, DOW CORNING 245 Fluid, DOW CORNING 344 Fluid and DOW CORNING 345 Fluid from DOW CORNING Corporation, Midland, MI., and SILICONE SF-1173 and SILICONE SF-1202 from General 20 Electric, Waterford, NY.

An example of a linear, low molecular weight, volatile polydimethylsiloxane compound is designated in the CTFA Dictionary as decamethyltetrasiloxane, available 25 commercially under the trade names DOW CORNING 200 Fluid having a viscosity of 1.5 cst and a boiling point of 195 °C. Other linear polydimethylsiloxanes include octamethyltrisiloxane, and decamethylpentasiloxane which also be useful in the composition of the present invention.

- 14 -

Volatile Hydrocarbon Oils which are optional but which may be included in compositions of the invention

The volatile hydrocarbon oil phase comprises about 6 to 20 carbon atoms. A preferred volatile hydrocarbon compound is an aliphatic hydrocarbon having about 8 to 16 carbon atoms, and having a boiling point of about 100 to 250 °C. Exemplary volatile hydrocarbon compound include, isododecane and isohexadecane, i.e., PERMETHYL 99A, PERMETHYL 101A, available from Presperse, Inc., South Plainfield, NJ. Other examples are depicted in general structure formula (I), wherein n ranges from 2 to 3.



20 Another exemplary volatile hydrocarbon compound is ISOPAR M (a C<sub>12</sub> - C<sub>14</sub> isoparaffin available From EXXON Chemical Co., Baytown, TX).

25 Non-volatile Silicone compounds which are included in compositions of the invention

Exemplary nonvolatile silicone compounds include a polydimethylsiloxane, polyalkyl siloxane, a polyaryl siloxane or a polyalkylaryl siloxane. The nonvolatile silicones are nonfunctional siloxanes or siloxane mixtures having a viscosity of about 10 to about 10,000cst, and most preferred viscosity about 10 to 500cst at 25°C. A

- 15 -

nonvolatile silicone compound is described as having a boiling point at atmospheric pressure of greater than about 250°C. A phenyltrimethicone also is useful as a nonvolatile silicone compound. An example includes DC 556 fluid, which 5 is available from Dow Corning.

Non-volatile hydrocarbon compounds which may or may not be included in compositions of the invention

10 The nonvolatile oil phase also can comprise a nonvolatile hydrocarbon compound, such as mineral oil, or isoeicosane. Other exemplary compounds include a water insoluble emollient, such as, for example, an ester having at least about 10 carbon atoms, and preferably about 10 to about 32 15 carbon atoms. Suitable esters include but are not limited to, for example, aliphatic monohydric alcohol esters including isopropyl myristate and aliphatic di- or tri-esters of polycarboxylic acids including dioctyl adipate.

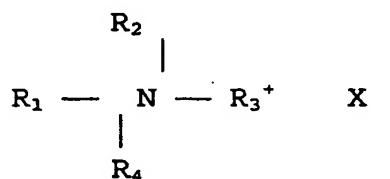
20 Examples of optional compounds which can be included in compositions of the invention

Exemplary classes of such compounds includes di-long chain 25 alkyl amines (i.e. C<sub>10</sub> to C<sub>22</sub>), long chain fatty amine (i.e. C<sub>10</sub> to C<sub>22</sub>), long chain fatty alcohols (i.e. C<sub>10</sub> to C<sub>22</sub>), ethoxylated fatty alcohols, and double-tailed phospholipids. Specific compounds capable of participating in the formation 30 of a lamellar dispersed phase, include dipalmitylamine, stearamidopropyldimethylamine, cetyl alcohol, stearyl alcohol, steareth-2, steareth-21, phosphatidylserine, phosphatidylcholine, and mixtures thereof.

- 16 -

Optional cationic surfactants may be used so long as they are miscible in the compositions of the invention. The optional cationic surfactants can have the structure:

5



wherein R<sub>1</sub> is an alkyl group including from about 8 to about 20 carbon atoms; R<sub>2</sub> is selected from the group consisting of an alkyl group including from about 8 to about 20 carbon atoms, a hydrogen atom, a methyl group, an ethyl group, a hydroxymethyl group and a hydroxyethyl group; R<sub>3</sub> is selected from the group consisting of a benzyl group, a hydrogen group, a methyl group, an ethyl group, a hydroxymethyl group and a hydroxyethyl group; R<sub>4</sub> is selected from the group consisting of a hydrogen atom, a methyl group, an ethyl group, a hydroxymethyl group and a hydroxyethyl group; and X is an anion. The quaternary nitrogen of the water-soluble quaternary ammonium compound also can be a component of a heterocyclic nitrogen-containing moiety, such as morpholine or pyridine. The anion of the quaternary ammonium compound can be any common anion, such as chloride, methosulfate, ethosulfate, nitrate, bromide, tosylate, acetate, or phosphate, and mixtures thereof.

30

The optional water-soluble quaternary ammonium compounds have one or two long chain alkyl groups containing from about 8 to about 18 carbon atoms. The long chain alkyl groups also can include, in addition to, or in replacement

of, carbon and hydrogen atoms, ether linkages or similar water-solubilizing linkages. The remaining two or three substitutes of the quaternary nitrogen of the quaternary ammonium compound can be hydrogen; benzyl; or short chain 5 alkyl or hydroxyalkyl groups, such as methyl, ethyl, hydroxymethyl or hydroxyethyl groups; or combinations thereof, either of the same or different identity.

Exemplary water-soluble quaternary ammonium compounds 10 include, but are not limited to, lauryltrimonium chloride; Quaternium-16; laurylalkonium chloride; olealkonium chloride; dilauryldimonium chloride; cetalkonium chloride; dicetyldimonium chloride; laurylpyridinium chloride; cetylpyridinium chloride; soyatrimonium chloride; 15 Polyquaternium-6; Polyquaternium-7; guarhydroxypropyltrimonium chloride; polyquaternium-11; polyquaternium-5; polyquaternium-10; polyquaternium-24; polyquaternium-37; cetyltrimonium chloride; Quaternium-24; mytrimonium chloride; PEG-2 cocomonium chloride; PEG-2 20 cocoyl quaternium 4; PEG-15 cocoyl quaternium 4; PEG-2 stearyl quaternium 4; PEG-15 stearyl quaternium 4; PEG-2 oleyl quaternium 4; PEG-15 oleyl quaternium 4, and mixtures thereof, wherein the compound designation is provided by the Cosmetic, Toiletry and Fragrance Association, Inc. in the 25 CTFA Cosmetic Ingredient Dictionary, 4th Ed., 1991, hereinafter referred to as the CTFA Dictionary. Other water-soluble quaternary ammonium compounds are listed in the CTFA Cosmetic Ingredient Handbook, 1st Ed., 1988 (hereinafter the CTFA Handbook) at page 40-42, incorporated 30 herein by reference.

- 18 -

Other optional ingredients included in compositions of the invention may be paraffin, isoparaffin, beeswax, microcrystalline wax, ozokerite wax, carnauba wax, candelilla wax, vaseline solid paraffin, squalene, oligomer 5 olefins and the like; amidoamines such as stearamidopropyl dimethylamine, isostearamidoethyl morpholine, behenamidopropyl dimethylamine and the like; humectants such as glycerine, propylene glycol, glycerol, sorbitol and the like; esters, such as isopropyl palmitate, isopropyl myristate, and stearyl stearate and the like; emulsifiers such as glycetyl monostearate, sorbitan monopalmitate, polyoxyethylene stearate and the like.

Optional holding polymers of the present invention include 15 vinyl and acrylic-based resins such as Copolymer 845, 937 and 958, a vinyl pyrrolidone/dimethylaminoethyl methacrylate copolymer, Styleze CC-10, a PVP/DMAPA Acrylates Copolymer, Polymer 1189 (Terpolymer of Vinyl pyrrolidone/Vinyl Caprolactam and 3-(N-Dimethylaminopropyl) Methacrylamide, all of which are available from International Specialty 20 Products; Gafquat polymers 734 and 755N designated as Quaternium-23, Gantrez ES-425 is the butyl ester of PVM/MA copolymer, all supplied by International Specialty Products, PVP K-30 to K-90, a polyvinylpyrrolidone of various 25 molecular weights, obtained from BASF, Flexan 130, a Sodium Polystyrene Sulfonate, obtained from National Starch, Amphomer 28-4910, an Octylacrylamide/acrylates/butylamino methacrylate copolymer supplied by National Starch, Amphomer LV-71, Octylacrylamide/Acrylates/Butylaminoethyl Methacrylate 30 Copolymer, Balance 0/55, a Methacrylate polymer, Versatyl-42, an Acrylates/Octylacrylamide Copolymer, Resyn 28-2930 is

- 19 -

VA/Crotonates/Vinyl Neodecanoate Copolymer and Lovocryl-47,  
an Octylacrylamide/Acrylates/Butylaminoethylmethacrylate  
Copolymer, Amaze Starch Polymer, all supplied by National  
Starch, Polyether Polyurethanes are available from Tyndale  
5 Plains Hunter, polyurethanes from IDPI, Luviset PUR  
polyurethanes from BASF, acrylates copolymers, acrylamide  
copolymers, acrylamide/sodium acrylate copolymer,  
acrylate/ammonium methacrylate copolymer, acrylate  
copolymers, acrylic/acrylate copolymers, acrylic esters and  
10 methacrylic esters copolymer, adipic  
acid/dimethylaminohydroxypropyl diethylenetriamine  
copolymer, adipic acid/ epoxypropyl diethylenetriamine  
copolymer, allyl stearate/VA copolymer, aminoethylacrylate  
phosphate/acrylate copolymer, ammonium acrylate copolymers,  
15 ammonium vinyl acetate/acrylate copolymers, AMP  
acrylate/diacetoneacrylamide copolymers, AMPD  
acrylate/diacetoneacrylamide copolymers, butylated PVP,  
butyl ester of ethylene/maleic anhydride copolymer, butyl  
ester of PVM/MA copolymer, calcium/sodium PVM/MA copolymer,  
20 corn starch/acrylamide/sodium acrylate copolymer, diethylene  
glycolamine/epichlorohydrin/piperazine copolymer,  
diglycol/cyclohexanedimethanol/Isophthalates/sulfoisophthalates  
AQ 55S polymer,  
diglycol/isophthalates/sulfoisophthalates copolymer AQ29S  
25 polymer, dodecanedioic acid/cetearyl alcohol/glycol  
copolymer, ethyl ester of PVM/MA copolymer, isopropyl ester  
of PVM/MA copolymer, Graft-copoly(dimethylsiloxane iso-butyl  
methacrylate), Graft-copoly (IBMA;MFOSEA/PDMS),  
methacrylates/acrylates copolymer/amine salt, methacryloyl  
30 ethyl betaine/methacrylate copolymers, octylacryl-  
amide/acrylate/butylaminoethyl methacrylate copolymers,

- 20 -

octylacrylamide/acrylate copolymers, phthalic anhydride/glycerin/glycidyl decanoate copolymer, phthalic/trimellitic/glycol copolymers, polyacrylamide, polyacrylamidomethylpropane sulfonic acid, polybutylene 5 terephthalate, polyethylacrylate, polyethylene, polymethacrylamidopropyl trimonium chloride, polyquaternium-1, polyquaternium-2, polyquaternium-4, polyquaternium-5, polyquaternium-6, polyquaternium-7, polyquaternium-8, polyquaternium-9, polyquaternium-10, polyquaternium-11, 10 polyquaternium-12, polyquaternium-13, polyquaternium-14, polyquaternium-15, polyquaternium-16, polyquaternium-24, polyquaternium-28, polyquaternium-37, polyquaternium-46, polyvinyl acetate, polyvinyl butyral, polyvinyl imidazolinium acetate, polyvinyl methyl ether, ethyl ester 15 of poly (methyl vinyl ether/maleic acid, butyl ester of poly (methyl vinyl ether/maleic acid, PVM/MA copolymer, PVP, PVP/acrylates copolymer, PVP/dimethylaminoethylmethacrylate terpolymer, PVP/eicosene copolymer, PVP/ethyl methacrylate/methacrylic acid copolymer, PVP/hexadecane copolymer, PVP/VA copolymer, PVP/VA/vinyl propionate copolymer, PVP/vinyl acetate copolymer, PVP/vinyl acetate/itaconic acid copolymer, quaternium-23, shellac, 20 sodium acrylate/vinyl alcohol copolymer, sodium carrageenan, starch diethylaminoethyl ether, stearylvinylether/maleic anhydride copolymer, sucrose benzoate/sucrose acetate isobutyrate/butyl benzyl phthalate copolymer, styrene/PVP copolymer, sucrose benzoate/sucrose acetate isobutyrate/butyl benzyl phthalate/methyl methacrylate copolymer, sucrose benzoate/sucrose acetate iso-butyrate 25 copolymer, Tricontanyl PVP, vinyl acetate/crotonate copolymers, vinyl acetate/crotonic acid copolymer, vinyl 30

acetate/butyl maleate/Isobornyl acetate copolymer, vinyl acetate/crotonic acid/methacryloxybenzophenone-1 copolymer, vinyl acetate/crotonic acid/vinyl neodecanoate copolymer, vinyl caprolactam/PVP/Dimethylaminoethyl methacrylate 5 copolymer, and mixtures thereof..

Optional saccharides which may optionally be used in the present invention include nonionic or cationic saccharides such as cellulose ethers including methyl cellulose, 10 carboxymethyl cellulose, hydroxy propyl methyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, and ethyl hydroxyethyl cellulose, dextrans obtained from Sigma, Kitamer PC, a chitosan carboxylate and Kytamer L, a chitosan lactate obtained from Amerchol, Gafquat HS-100, 15 Polyquaternium-28 from International Specialties, polyquaternium-4, polyquaternium-10, sodium alginate, agarose, amylopectins, amyloses, arabinans, arabinogalactans, arabinoxylans, carrageenans, gum arabic, cellulose derivatives such as methylcellulose, 20 hydroxypropylmethylcellulose, hydroxyethyl cellulose, carboxymethylcellulose, carboxymethylguar gum, carboxymethyl(hydroxypropyl)guar gum, hydroxyethylguar gum, hydroxypropylguar gum, cationic guar gum, chondroitins, chitins, chitosans, cocodimonium hydroxypropyl oxyethyl 25 cellulose, colominic acid [poly(N-acetyl-neuraminic acid)], corn starch, curdlan, dermatin sulfate, furcellarans, dextrans, cross-linked dextrans known as dextranomer (Debrisan), dextrin, emulsan, flaxseed saccharide (acidic), galactoglucomannans, galactomannans, glucomannans, 30 glycogens, guar gum, or hydroxyethylstarch, hydroxypropylstarch, hydroxypropylated guar gums, gellan

- 22 -

gum, glucomannans, gellan, gum ghatti, gum karaya, gum tragacanth (tragacanthin), heparin, hyaluronic acid, inulin, keratan sulfate, konjac mannan, laminarans, laurdimonium hydroxypropyl oxyethyl cellulose, liposan, locust bean gum, 5 mannans, nigeran, nonoxynyl hydroxyethyl cellulose, okra gum, oxidized starch, pectic acids, pectins, polydextrose, potato starch, protopectins, psyllium seed gum, pullulan, sodium hyaluronate, steardimonium hydroxyethyl cellulose, raffinose, rhamsan, tapioca starch, welan, levan, 10 scleroglucan, stachyose, succinoglycan, wheat starch, xanthan gum, xylans, xyloglucans, and mixtures thereof. Microbial saccharides can be found in the fourth edition of Kirk-Othmer Encyclopedia of Chemical Technology, Fourth Edition. Vol. 16, John Wiley and Sons, NY pp. 578-611, 1994 15 which is herein incorporated by reference. Complex carbohydrates can be found in the fourth edition of Kirk-Othmer Encyclopedia of Chemical Technology, Fourth Edition. Vol. 4, John Wiley and Sons, NY pp. 930-948, 1994 which is herein incorporated by reference.

30 Thickeners can be utilized alone or in combination so long as the chosen thickeners are compatible with the compositions of the invention (that is, that they cause the compositions of the invention to thicken). Thickeners can 25 include, for example, Acrylic acid homopolymers under the Carbopol name from BF Goodrich, acrylates/C10-30 alkyl acrylate crosspolymer (Carbopol 1342, 1382, Pemulins TR-1 and TR-2 from BF Goodrich), Acrylates/Steareth-20 Itaconate Copolymer, Acrylates/Ceteth-20 Itaconate Copolymer, National 30 Starch, Bentonite, PVM/MA Decadiene Crosspolymer from International Specialties Products, Acrylates/steareth-20

methacrylate copolymer, Acrysol ICS-1, Rohm and Haas Co., acrylamide/sodium acrylate copolymer, Hostacerin PN 73, Hoechst AG., acrylate copolymer (Antil 208) supplied by Goldschmidt, acrylic acid/acrylonitrogens copolymer (Hypan 5 SA-100H, SR-150H) supplied by Lipo, Acrylic/acrylate copolymer (Carboset 5 514, 515, 525, XL-19, XL-19X2, XL-28, XL-40, 526) supplied by BF Goodrich, Ammonium acrylates/acrylonitrogens copolymer (Hypan SS-201) from Lipo, Quaternium-18 Bentonite, Sodium salt of crosslinked 10 poly(acrylic acid) under the tradenames PNC 430, PNC 410, PNC 400 from 3V, Stearalkonium Bentonite, Claytone, supplied by Southern Clay, Quaternium-18 Hectorite (Bentone 38), Stearalkonium Hectorite (Bentone 27) supplied by Rheox, acrylamide/sodium acrylate copolymer (Hostacerin PN 73) 15 supplied by Hoechst, Poly(acrylic acid) known as Carbopol 400 series (BF Goodrich) or Aquatreat (Alco 3V), polyquaternium-18 (Mirapol AZ-1) from Rhone Poulenc, polyquaternium-27, polyquaternium-31, polyquaternium-37, trihydroxystearin (Thixcin from Rheox; Flowtone from 20 Southern Clay), Dimethylaminoethyl methacrylamide and acrylamide copolymer (Salcare SC63 from Ciba Specialties), Acrylic polymer anionic or cationic thickening agents (Synthalen CR and its related compounds) from 3V Sigma.

25 Other thickeners and polymers can be found in the "The Encyclopedia of Polymers and Thickeners for Cosmetics," Cosmetics and Toiletries, Lochhead, R., pp. 95-138, Vol. 108, (May 1993).

30 The compositions may also optionally contain a topically active agent selected from but not limited to para-

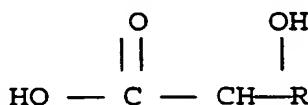
- 24 -

aminobenzoic acid (PABA); PABA esters, such as glyceryl PABA, amyldimethyl PABA and octyldimethyl PABA; cinnamates, such as octyl methoxycinnamate, ethylhexyl para-methoxycinnamate, 2-ethoxyethyl para-methoxycinnamate and 5 cinoxate, benzophenones, such as benzophenone-4, oxybenzone and sulisobenzene, salicylates, such as octyl salicylate, anthranilates, such as methyl anthranilate; and mixtures thereof.

10

The topically active compound may also be an alpha hydroxy acid having the following structure:

15



wherein R can be hydrogen or an alkyl from 1 to 28 carbons.

20 Further optional components can include, for example: pH adjusting agents, viscosity and rheology modifiers, 25 pearlescers, opacifiers, suspending agents, bacteriocides, coloring agents, fragrances, ultraviolet protective agents, dyes, proteins, herb and plant extracts, polyols, and other moisturizing and/or conditioning agents.

30

The topically active compound may also be a hair growth promoter such as glucarolactams, glucarolactones, and diacylglycerols, and mixtures, thereof.

Compositions of the invention can take the form of leave-in or rinse out conditioners. They can also be shampoos or

- 25 -

styling aids. Compositions of the invention can also be skin care products.

To use the rinse out compositions of the invention to condition hair, one first wets the hair, then applies the composition of the invention, next lathers the hair, and finally rinses the hair. Alternatively, water and conditioner may be applied to the hair simultaneously. Conditioning with compositions may be done right after shampooing when the hair is still wet. Alternatively, conditioning of the hair may be performed separately from shampooing on either wet or dry hair. Compositions of the invention may be leave-in conditioners as mentioned above. In such cases, the compositions of the invention are usually worked into the hair usually by using the fingers. Compositions of the invention may be used as shampoos by application to wet hair followed by lathering and rinsing. They may be used as styling aids in a conventional manner. They may also be used as skin care products in a conventional manner.

Compositions of the invention provide unexpectedly superior conditioner properties without the use of fatty alcohols.

Embodiments of the present invention will now be further illustrated by reference to the following examples and tables.

Compositions of the invention are made as follows:

- 30 1. The oil phase is mixed.
2. The aqueous phase is added slowly to the oil phase.

ExamplesExamples of Wet Combing Force Data

5

| Composition              | A              | B              | C              |
|--------------------------|----------------|----------------|----------------|
|                          | Weight percent | Weight percent | Weight percent |
| <b>Oil Phase</b>         |                |                |                |
| DC 3225C                 | 0              | 4.00           | 5.70           |
| DC 5225C                 | 3.00           | 0              | 0              |
| DC200, 10cst             | 0.67           | 0              | 0              |
| DC200, 5cst              | 1.33           | 0              | 0              |
| DC 200, 1.5cst           | 2.00           | 6.50           | 6.90           |
| DC200, 0.65cst           | 0              | 0              | 0              |
| DC 245                   | 3.40           | 0              | 0              |
| <b>Fragrance</b>         | 0.30           | 0              | 0              |
|                          |                |                |                |
| <b>Aqueous Phase</b>     |                |                |                |
| Water                    | 89.00          | 85.20          | 83.20          |
| Salcare SC-96, 50%       | 1.00           | 0              | 0              |
| Sodium Chloride          | 0              | 4.00           | 3.90           |
| Preservative             | 0.30           | 0.30           | 0.30           |
|                          |                |                |                |
| <b>Total</b>             |                |                |                |
| Combing force (gm force) | 8.7gm          | 36.2gm         | 35.9gm         |

\*Salcare SC-96 is polyquaternium-37/propylene glycol/dicaprylate dicaprate and PPG-1

10 Trideceth-6 available from Ciba Specialty Chemicals, Suffolk, Virginia.

15 Compositions A, B, and C above are all compositions of the invention. It is noted that the silicone surfactants DC 3225C AND DC 5225Care made up of a silicone surfactant and 80% of a volatile silicone such as D4 or D5.

**Test 1 - Instron Wet Combing**

Wet combing experiments were carried out utilizing an  
5 Instron 5500 Series. All testing was carried out by applying 0.3ml of product to bleached and waved 2g hair tresses. Results are expressed in terms of maximum load (gm of force).  
10 Conventional Body conditioners have an average 13.1gm to about 40gm of force, whereas Example A has improved combing forces of about 8.7gm. Examples B and C have combing forces of about 36.2 and 35.9gm, respectively in order to impart greater body, volume and stylability to the hair. In other  
15 words, the increase in wet combing force caused by compositions of the invention is an advantageous property. Further examples demonstrate the versatility of the invention. Products that vary in softness, body and conditioning levels appear below. All examples may be left  
20 upon the hair or rinsed out. These products may also be utilized on the skin as well.

**Salon Testing**

25 The following Salon Blitz Testing table is a summary of the results from a salon test conducted. The benchmark for these studies was a moisturizing conditioner product sold in the North American market. These data indicated that Example C outperformed the benchmark formulation in its  
30 ability to deliver hair body as reported by the models.

**Test 2 - Salon Blitz**

Salon Blitz utilized female conditioner users as the panelists. A professional hair stylist applied the test product to half of the head and the benchmark product to the 5 other side of the panelist's head. Once product has been applied, the stylist distributed the product evenly and left on the hair, keeping both sides separated. Product is then rinsed off after one minute. The panelists then dried and 10 styled their own hair. A questionnaire was provided to each panelist asking them to rate (on a 9 point scale) hair characteristics for both the left and right side of the head. Higher values for key characteristics such as softness and fullness indicated a higher intensity for these attributes and therefore better performance on the hair. 20 15 panelists were recruited for each test product evaluation. Results for this test are shown in Table 1. The following Salon Blitz Testing table is a summary of the results from a salon test conducted. The benchmark for these studies was a moisturizing product sold in the North American market.

Table 1. Salon testing of Example C versus Benchmark Moisturizing Conditioner.

| Attribute      | Example C | Moisturizing benchmark-a commercial product | Difference |
|----------------|-----------|---|------------|
| Overall Liking | 6.83      | 6.42  | +0.41      |
| Body Added     | 7.05      | 6.11  | +0.94      |
| Conditioning   | 6.89      | 6.21  | +0.68      |
| Fullness       | 7.11      | 6.00  | +1.11**    |
| Bounce         | 7.16      | 5.95  | +1.21**    |

- 29 -

|                       |      |      |         |
|-----------------------|------|------|---------|
| Softness              | 7.42 | 6.63 | +0.79   |
| Amt:<br>Conditioning  | 6.47 | 6.95 | +0.68   |
| Amt. Body             | 6.47 | 5.68 | +0.79   |
| Coating               | 3.53 | 4.47 | -0.94   |
| Amt. Bounce           | 6.84 | 5.37 | +1.47** |
| Amt. Volume           | 6.21 | 5.00 | +1.21** |
| Ease<br>of<br>Styling | 7.42 | 6.74 | +0.68   |
| Static                | 2.16 | 3.16 | -1.00** |

\*A positive difference noted enhanced performance except in the case for static and coating where "Less static" and "Less coating" is desirable.

5

\*\*90% Confidence Level.

These data indicated that Example C outperformed the benchmark formulation in its ability to enhance hair body, 10 bounce, volume and ease of styling without sacrificing softness as reported by the models.

15

20

25

30

- 30 -

Examples of Conditioner and Frizz Tamer Products

| Composition                   | D              | E              | F              | G              | H              | I              |
|-------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                               | Weight percent |
| <b>Oil Phase</b>              |                |                |                |                |                |                |
| DC 5225C                      | 5              | 5              | 4              | 7              | 5              | 3              |
| DC 200, 10cst                 | 0              | 0              | 0.5            | 4              | 4              | 4              |
| DC 200, 5cst                  | 3              | 3              | 3              | 0              | 0              | 0              |
| DC 200, 1.5cst                | 2              | 2              | 2              | 4              | 0              | 0              |
| DC 245                        | 0              | 0              | 4              | 0              | 2              | 4              |
| Permethyl 101A                | 0              | 0              | 0              | 0              | 0              | 2              |
| Fragrance                     | 0.25           | 0.25           | 0.30           | 0.25           | 0.25           | 0.25           |
| DC-2-9040, 16%                | 0              | 0              | 1.5            | 0              | 0              | 0              |
| IDPI Polyurethane             | 0              | 0.22           | 0              | 0              | 0              | 0              |
| <b>Aqueous Phase</b>          |                |                |                |                |                |                |
| Hydroxyethylcellulose         | 0              | 0              | 0              | 0              | 0              | 1.0            |
| Deionized Water               | 86.45          | 85.23          | 80.52          | 80.55          | 84.45          | 81.45          |
| Soft water                    | 0              | 0              | 0              | 0              | 0              | 0              |
| Dicetyldimonium chloride, 30% | 3.00           | 0              | 0              | 0              | 0              | 0              |
| Preservative                  | 0.30           | 0.30           | 0.29           | 0.30           | 0.30           | 0.30           |
| Sodium Chloride               | 0              | 4.00           | 3.89           | 3.90           | 4.00           | 4.00           |
| Total                         | 100            | 100            | 100            | 100            | 100            | 100            |
| Combing force<br>(gm) force)  | NA             | 35.5           | 37.2           | NA             | NA             | NA             |

Permethyl 101A is a hydrocarbon available from Presperse, Inc., South Plainfield, New Jersey. DC-2-9040, 16% is a crosslinked polydimethylsiloxane available from Dow Corning, Midland, Michigan. IDPI polyurethane is a silicone polyurethane obtained from Alzo, Sayreville, New Jersey.

Examples D and E were designed to give greater softness to the hair. Examples F, G, H and I were designed to tame and control curly, thick or frizzy hair.

The following Salon Blitz Testing table is a summary of the results from a salon test conducted. The benchmark for these studies was a frizz taming product sold in the North American market. These data indicated that the HIPE formulation Example H outperformed the benchmark formulation in dispensing, application and in its ability to deliver hair body as reported by the models.

10 Test 3 - Salon Blitz

Salon Blitz utilized female frizz product users as the panelists. A professional hair stylist applied the test product to half of the head and the benchmark product to the other side of the panelist's head. Once product has been applied, the stylist distributed the product evenly and left on the hair, keeping both sides separated. The panelists then dried and styled their own hair. A questionnaire was provided to each panelist asking them to rate (on a 9 point scale) hair characteristics for both the left and right side of the head. Higher values for key characteristics such as softness and fullness indicated a higher intensity for these attributes and therefore better performance on the hair. Approximately 20 panelists were recruited for each test product evaluation. Results for this test are shown in Table 2.

Table 2. Salon testing of Example H versus a leading commercial frizz control product.

| Attribute Intensity | Frizz Benchmark- a commercial product | Example H |
|---------------------|---------------------------------------|-----------|
| Ease of Dispensing  | 2.9                                   | 7.7*      |
| Ease of Application | 5.5                                   | 8.3*      |
| Overall liking      | 6.3                                   | 6.6       |
| Less frizzies       | 2.9                                   | 4.0       |
| Softness            | 7.4                                   | 7.8       |
| Fullness            | 6.6                                   | 7.1       |
| Bounce              | 6.2                                   | 6.4       |
| More Flat/Limp      | 3.6                                   | 3.0       |

5 \*90% Confidence Level.

Example A as a Leave-in Conditioner

Test 4 was similar to the salon application described in Test 2.

10

Table 3. Half-head Salon Testing versus Competitive Leave-in Conditioner.

| Attribute Intensity | Leave-in Benchmark | Example A |
|---------------------|--------------------|-----------|
| Overall liking      | Equal              | Equal     |
| Ease of wet combing | Control            | Advantage |
| Manageability       | Control            | Advantage |
| Body                | Control            | Advantage |

Example A presented distinct advantages in wet combing, manageability and body versus a competitive leave-in 5 conditioner benchmark.

Examples of Styling Conditioners

| Composition           | J              | K              | L              | M              | N              | O              |
|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                       | Weight percent |
| Oil Phase             |                |                |                |                |                |                |
| DC 5225C              | 2              | 5              | 5              | 5              | 5              | 5              |
| DC 200, 10cst         | 0              | 0              | 0              | 0              | 0              | 0              |
| DC 200, 5cst          | 3              | 0              | 3              | 2              | 2              | 2              |
| DC 200, 1.5cst        | 0              | 2              | 2              | 3              | 3              | 3              |
| DC 245                | 4              | 3              | 0              | 0              | 0              | 0              |
| DC 200, 0.65cst       | 0              | 1              | 0              | 0              | 0              | 0              |
| Permethyl 101A        | 1              | 0              | 0              | 0              | 0              | 0              |
| Fragrance             | 0.25           | 0.25           | 0.25           | 0.25           | 0.25           | 0.25           |
|                       |                |                |                |                |                |                |
| Aqueous Phase         |                |                |                |                |                |                |
| Deionized Water       | 0              | 84.95          | 69.70          | 79.15          | 83.13          | 82.65%         |
| Soft water            | 84.05          | 0              | 0              | 0              | 0              | 0              |
| Hydroxyethylcellulose | 0.40           | 1.00           | 0              | 0              | 0              | 0              |
| Copolymer 20%         | 845, 1.00      | 2.50           | 0              | 0              | 1.00           | 1.00           |
| Styleze 10%           | CC-10, 0       | 0              | 15.00          | 0              | 0              | 0              |
| Gafquat 755N, 20%     | 0              | 0              | 0              | 5.00           | 0              | 0              |
| PVP/VA                | 0              | 1.00           | 0              | 0              | 2.00           | 0              |
| PVP                   | 0              | 0              | 0              | 0              | 0              | 2.00           |
| Polyquaternium-4      | 0              | 0              | 0              | 0              | 0              | 0.25           |
| Preservative          | 0.30           | 0.30           | 0.30           | 0.30           | 0.30           | 0.30           |
| Potassium Chloride    | 4.00           | 0              | 0              | 0              | 0              | 0              |
| Sodium Chloride       | 0              | 0              | 0              | 0              | 0              | 0              |
|                       |                |                |                |                |                |                |
| Total                 | 100            | 100            | 100            | 100            | 100            | 100            |

- 34 -

These formulations were found to have improved the stylability of the hair when left in the hair when compared to typical gel or leave-in conditioner.

- 35 -

Examples of Extra Body Conditioner Formulations or Skin Care Formulations

X X X

| Composition          | P              | Q              | R              | S              |
|----------------------|----------------|----------------|----------------|----------------|
|                      | Weight percent | Weight percent | Weight percent | Weight percent |
| Oil Phase            |                |                |                |                |
| DC 3225C or DC 5225C | 4.00           | 4.00           | 0              | 0              |
| DC 5180C, 49%*       | 0              | 0              | 0.40           | 0.40           |
| DC 200, 10cst        | 0              | 1.00           | 1.00           | 1.00           |
| DC 200, 5cst         | 6.00           | 1.00           | 1.00           | 1.00           |
| DC 200, 1.5cst       | 2.00           | 2.00           | 3.60           | 0              |
| DC 200, 1-2cst       | 0              | 2.00           | 2.00           | 1.80           |
| DC 200, 0.65cst      | 0              | 2.00           | 2.00           | 1.80           |
| Fragrance            | 0.25           | 0.25           | 0.25           | 0.25           |
| Aqueous Phase        |                |                |                |                |
| Deionized Water      | qs             | qs             | qs             | qs             |
| Soft water           | 84.75          | 84.75          | 84.75          | 84.75          |
| Sodium Chloride      | 3.00           | 3.00           | 3.00           | 3.00           |
| Total                | 100            | 100            | 100            | 100            |

5

\*49% Dimethicone copolyol supplied by Dow Corning, Midland, Michigan.

Salon Testing

The following Salon Blitz Testing table is a summary of the results from a series of salon tests conducted. The 5 benchmark for these studies is the best selling commercial extra body conditioner in the North American market. These data indicated that the HIPE formulation (Example P) outperformed the benchmark formulation in both overall conditioning and in its ability to deliver hair body as 10 reported by the models.

Test 5 - Salon Blitz

Salon Blitz utilized female conditioner users as the 15 panelists. A professional hair stylist applied the test product to half of the head and the benchmark product to the other side of the panelist's head. Once product has been applied, the stylist distributed the product evenly and rinsed it out taking care to keeping both sides separated. 20 The panelists then dry and style their own hair. A questionnaire was provided to each panelist asking them to rate (on a 9 point scale) hair characteristics (e.g. conditioning and body) for both the left and right side of the head. Higher values for key characteristics such as 25 conditioning or body indicates a higher intensity for these attributes and therefore better performance on the hair. 20 panelists were recruited for each test product evaluation. Results for this test are shown in Table 4.

Table 4. Salon testing of Extra Body Conditioner examples P versus benchmark conditioner.

| Attribute      | Example P | Benchmark<br>-a<br>commercia<br>l product | Differ<br>ence |
|----------------|-----------|---|----------------|
| Overall Liking | 6.47      | 5.63                                      | +0.84          |
| Wet Feel       | 6.37      | 5.58                                      | +0.79          |
| Wet Detangling | 6.89      | 6.26                                      | +0.63          |
| Combing        | 6.26      | 6.26                                      | 0.00           |
| Styling        | 5.78      | 6.00                                      | -0.22          |
| Coating        | 5.26      | 5.74                                      | -0.48          |
| Conditioning   | 5.37      | 5.00                                      | +0.37          |
| Softness       | 5.84      | 5.68                                      | +0.16          |
| Body           | 5.5       | 5.05                                      | +0.45          |
| Bounce         | 5.21      | 4.83                                      | +0.38          |
| Volume         | 5.32      | 4.89                                      | +0.43          |

5 The above table shows that Example P delivered body without affecting conditioning performance. The results suggest that example P outperformed the benchmark conditioner in many areas. Without being held to this view, it is postulated that the enhanced overall liking, wet feel  
10 detangling, softness, body, bounce and volume may be attributed to the lack of fatty alcohol materials which may build up on the hair and weigh the hair down.

15 The above compositions may also be utilized as skin care products such as lotions, gels and shaving cream.

Examples of Skin Compositions

| Composition                | T              | U              | V              | W              | X              | Y              |
|----------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                            | Weight percent |
| <b>Oil Phase</b>           |                |                |                |                |                |                |
| DC 5225C                   | 8              | 10.00          | 7.00           | 4.00           | 4.00           | 4.00           |
| DC 200, 10cst              | 0              | 0              | 4.00           | 0              | 0              | 0              |
| DC 345                     | 13             | 7.00           | 0              | 0              | 0              | 0              |
| DC 200, 1.5cst             | 0              | 0              | 4.00           | 6.50           | 6.50           | 6.50           |
| DC 200, 0.65cst            | 0              | 0              | 0              | 0              | 0              | 0              |
| Isopropyl myristate        | 0              | 7.00           | 0              | 0              | 0              | 0              |
| Neutralizing agent         | 0              | qs             | 0              | 0              | 0              | 0              |
| Fragrance                  | 0.20           | 0.20           | 0.20           | 0.20           | 0.20           | 0.20           |
| Octyl methoxy cinnamate    | 0              | 0              | 0              | 0              | 0              | 1.00           |
| Cetyl dimethicone Copolyol | 0              | 0              | 0              | 0              | 0.10           | 0              |
| <b>Aqueous Phase</b>       |                |                |                |                |                |                |
| 2-hydroxy stearic acid     | 1.00           | 6.00           | 1.00           | 1.00           | 1.00           | 1.00           |
| Propylene glycol           | 15             | 0              | 0              | 0              | 0              | 0              |
| Deionized Water            | qs             | qs             | qs             | qs             | qs             | qs             |
| Polysorbate-20, 97%        | 7.00           | 0              | 0              | 0              | 0              | 0              |
| Ethanol (SD-40, 200 Proof) | 7.00           | 0              | 0              | 0              | 0              | 0              |
| Sodium Chloride            | 0              | 2.00           | 4.00           | 3.00           | 3.00           | 3.00           |
| <b>Total</b>               | <b>100</b>     | <b>100</b>     | <b>100</b>     | <b>100</b>     | <b>100</b>     | <b>100</b>     |

In the above table compositions T and U are controls.

**Test 6 - Spreading, Greasiness and Residue Panel**

The skin products were evaluated by rubbing 0.2g of product 5 onto a watch glass and spreading the sample to create a smooth film. The spreading ease and greasiness was then ranked. A similar amount of material was also rubbed onto the skin and then ranked in order of fastest to slowest absorption (residue). The smooth afterfeel was also ranked. 10 It is noted that a lower number indicates more desirable performance aesthetics. Examples T and U were more tacky, sticky and undesirable on the skin when compared to Examples V and W. Examples V and W dried without a tacky transition phase. It was found that examples V and W also have the 15 benefit of leaving behind very little residue and no greasy/oily afterfeel. In addition, examples T and U were more difficult to wash off the skin.

**Table 5. Skin Cream Test Results.**

| Composition | Spreading Ease* | Greasiness | Residue | Smooth Afterfeel |
|-------------|-----------------|------------|---------|------------------|
| T           | 4               | 4          | 4       | 4                |
| U           | 3               | 3          | 3       | 3                |
| V           | 2               | 2          | 2       | 2                |
| W           | 1               | 1          | 1       | 1                |

\*A lower number for key characteristics indicates a lower intensity for these attributes and indicates better performance.

25 It should be understood that the present disclosure has been made only by way of preferred embodiment and that numerous

changes in detail of construction, combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention herein claimed.

Claims

1. A composition which is selected from the group consisting of:

5

A.) a hair care composition which is a high internal phase water-in-oil emulsion which comprises:

(I) an oil phase which further comprises

i.) a mixture of non-volatile and volatile silicone oils, and

10

(II) ii.) a silicone surfactant; and

an aqueous phase; and which substantially lacks a fatty alcohol; and

15 B.) a skin care composition which is a high internal phase water-in-oil emulsion which comprises:

(I) an oil phase which further comprises i.) a mixture of non-volatile and volatile silicone oils, and ii.) a silicone surfactant; and

20

(II) which comprises an aqueous phase.

25 2. A composition according to claim 1 wherein the silicone surfactant is present from about 2% to about 15%.

25

3. A composition according to claim 1 wherein the non-volatile silicone is present from about 0.01% to about 10%.

30

- 42 -

4. A composition according to claim 1 wherein the volatile silicone component is present at about 0.01% to about 10%.

5 5. A composition according to claim 1 wherein aqueous phase is present from about 80% to about 95%.

6. A composition according to claim 1 further comprising an  
10 inorganic or organic salt in the aqueous phase.

7. A composition according to claim 1 further comprising an anionic, cationic or amphoteric or nonionic surfactant.

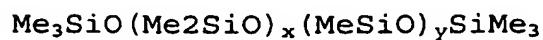
15

8. A composition according to claim 1 further comprising a water soluble or oil soluble holding polymer.

20

9. A composition according to claim 1 further comprising a thickener.

25 10. A composition according to claim 2 wherein the silicone surfactant is a dimethylsiloxane of the formula:



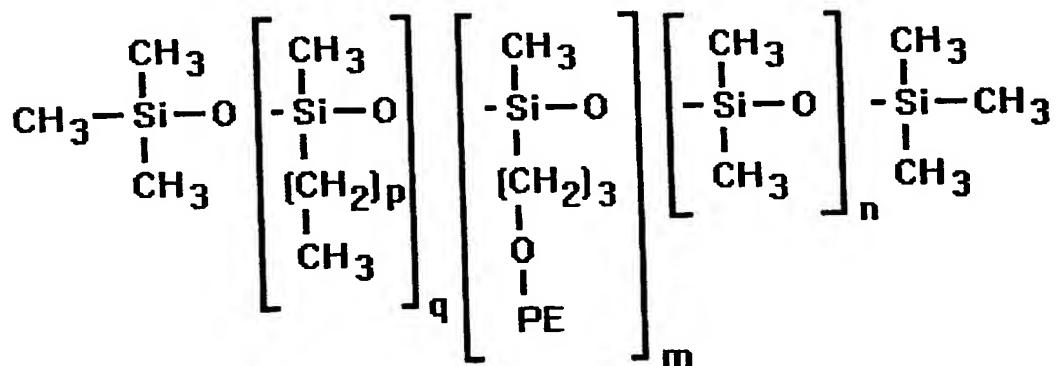
30 |

PE

where PE=  $-\text{CH}_2\text{CH}_2\text{CH}_2\text{O}(\text{EO})_m(\text{PO})_n\text{Z}$ ,

5 wherein Me represents methyl, EO represents ethyleneoxy, PO represents 1,2-propyleneoxy, x and y are 1 or greater, m and n can be 0 or greater, however the molecular weight of the PE unit must be greater than 1000, and Z can be either hydrogen or a lower alkyl radical.

10 11. A composition according to claim 2 wherein the silicone surfactant is an alkyl dimethicone copolyol of the formula:



15 wherein p is a numeral from 7 through 17; q is a numeral from 1 through 100; m is a numeral from 1 through 40; n is a numeral from 0 through 200; and PE is  $(\text{C}_2\text{H}_4\text{O})_a(\text{C}_3\text{H}_6\text{O})_b\text{-H}$  having a molecular weight of about 250 to about 2000, wherein a and b are selected such that the weight ratio of  
 20  $\text{C}_2\text{H}_4\text{O}/\text{C}_3\text{H}_6\text{O}$  is from 100/0 to 20/80.

12. A composition according to claim 16 wherein the mixture of volatile silicone oils contains an oil in the range of about 1.4 to about 1.6cst and a silicone oil in the range of about 0.5 to about 0.7cst.

5

13. A composition according to claim 17 wherein one volatile silicone oil has a viscosity of about 0.5cst and the other volatile silicone oil has a viscosity of about 1.5cst.

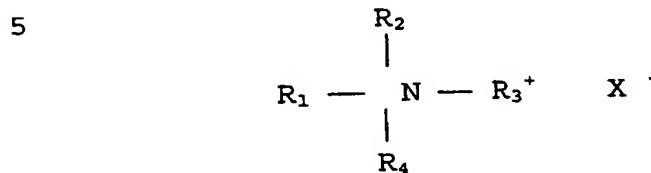
10

14. A composition according to claim 6, wherein the salt is an inorganic or organic salt wherein the salt is sodium chloride, potassium chloride, sodium citrate, sodium lactate, aluminum zirconium glycinate, aluminum chlorohydrate, salts of amino acids, or mixtures thereof.

20 15. A composition according to claim 7, wherein the anionic surfactant is selected from the group consisting of alkyl sulphates, alkyl aryl sulphonates, alkyl ether sulphonates, alkyl ether sulfates, alkyl sulfonates, alkyl isothionates, alkyl succinates, alkyl sulphosuccinates, 25 alkyl sarcosinates, alkyl phosphates, alkyl carboxylates, alkyl ether carboxylates and alpha-olefin sulphonates; and their sodium, magnesium, ammonium, and mono-, di-, and tri-ethanolamine salts, and mixtures thereof.

30

16. A composition according to claim 7, wherein the cationic surfactant has the structure:



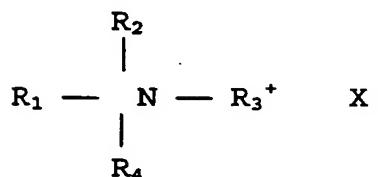
10 wherein  $R_1$  is an alkyl group including from about 8 to about 20 carbon atoms;  $R_2$  is selected from the group consisting of an alkyl group including from about 8 to about 20 carbon atoms, a hydrogen atom, a methyl group, an ethyl group, a hydroxymethyl group and a hydroxyethyl group;  $R_3$  is selected from the group consisting of a benzyl group, a hydrogen group, a methyl group, an ethyl group, a hydroxymethyl group and a hydroxyethyl group;  $R_4$  is selected from the group consisting of a hydrogen atom, a methyl group, an ethyl group, a hydroxymethyl group and a hydroxyethyl group; and  $X$  is an anion selected from the group consisting of chloride, methosulfate, ethosulfate, nitrate, bromide, tosylate, acetate, or phosphate, and mixtures thereof.

15

20

17. A composition according to claim 23, wherein the cationic surfactant has the structure:

5



10

and the quaternary nitrogen and two of  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$ , form a heterocyclic nitrogen-containing moiety, selected from the group consisting of morpholine and pyridine.

15

18. A hair product comprising the composition of claim 1 in a form selected from the group consisting of shampoo, conditioner, spray, mousse, gel, foam, styling conditioner, hair serum, lotion, crème, treatment product or pomade.

20

19. A skin product comprising the composition of claim 1 in a form selected from the group consisting of gel, body wash, lotion, or cream.

20. A method of treating the hair or skin with a composition according to claim 1.

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/05109

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 A61K7/00 A61K7/06 A61K7/48

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 7 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|----------|---|-----------------------|
| X        | US 5 587 153 A (ANGELONE JR PHILIP P ET AL) 24 December 1996 (1996-12-24)<br>cited in the application<br>claims 1,25<br>---   | 1,11,19               |
| X        | EP 0 490 582 A (UNILEVER PLC ;UNILEVER NV (NL)) 17 June 1992 (1992-06-17)<br>claims 1,4,8; example II<br>---  | 1,11,18               |
| A        | PATENT ABSTRACTS OF JAPAN<br>vol. 014, no. 431 (C-0759),<br>17 September 1990 (1990-09-17)<br>& JP 02 167212 A (SHISEIDO CO LTD),<br>27 June 1990 (1990-06-27)<br>abstract<br>--- | 1,11<br>-/-           |

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the International filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*Z\* document member of the same patent family

Date of the actual completion of the international search

17 November 2000

Date of mailing of the international search report

24/11/2000

Name and mailing address of the ISA  
 European Patent Office, P.B. 5818 Patenttaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

Voyiazoglou, D

## INTERNATIONAL SEARCH REPORT

Intern. Appl. No.

PCT/EP 00/05109

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages                              | Relevant to claim No. |
|----------|---|-----------------------|
| A        | EP 0 638 308 A (DOW CORNING)<br>15 February 1995 (1995-02-15)<br>claims 1,4,8,9,11<br>---                       | 1,19                  |
| A        | EP 0 379 677 A (GEN ELECTRIC)<br>1 August 1990 (1990-08-01)<br>claims 1,10; example 12<br>---                   | 1                     |
| A        | US 5 534 246 A (HERB CRAIG A ET AL)<br>9 July 1996 (1996-07-09)<br>cited in the application<br>claim 1<br>---   | 1                     |
| A        | US 4 311 695 A (STARCH MICHAEL S)<br>19 January 1982 (1982-01-19)<br>cited in the application<br>claim 1<br>--- | 1                     |
| A        | EP 0 595 683 A (OREAL)<br>4 May 1994 (1994-05-04)<br>claims 1,6,7<br>---  | 1,11                  |
| A        | US 5 656 280 A (HERB CRAIG A ET AL)<br>12 August 1997 (1997-08-12)<br>claims 1,44<br>-----                      | 1,11                  |

# INTERNATIONAL SEARCH REPORT

## Information on patent family members

Intern. Application No

PCT/EP 00/05109

| Patent document cited in search report | Publication date | Patent family member(s) |  | Publication date |
|--|------------------|-------------------------|--|------------------|
| US 5587153                             | A 24-12-1996     | US 5863525 A            |  | 26-01-1999       |
|  |                  | AT 177318 T             |  | 15-03-1999       |
|  |                  | CA 2069747 A            |  | 05-04-1992       |
|  |                  | DE 69130978 D           |  | 15-04-1999       |
|  |                  | DE 69130978 T           |  | 09-09-1999       |
|  |                  | DK 504372 T             |  | 27-09-1999       |
|  |                  | EP 0504372 A            |  | 23-09-1992       |
|  |                  | ES 2128325 T            |  | 16-05-1999       |
|  |                  | FI 922563 A             |  | 03-06-1992       |
|  |                  | GR 3029651 T            |  | 30-06-1999       |
|  |                  | MX 9101423 A            |  | 05-06-1992       |
|  |                  | NO 922190 A             |  | 03-06-1992       |
|  |                  | WO 9205767 A            |  | 16-04-1992       |
| EP 0490582                             | A 17-06-1992     | AU 644245 B             |  | 02-12-1993       |
|  |                  | AU 8837791 A            |  | 11-06-1992       |
|  |                  | BR 9105287 A            |  | 18-08-1992       |
|  |                  | CA 2056859 A            |  | 08-06-1992       |
|  |                  | JP 4290812 A            |  | 15-10-1992       |
|  |                  | ZA 9109613 A            |  | 07-06-1993       |
| JP 02167212                            | A 27-06-1990     | JP 2919495 B            |  | 12-07-1999       |
| EP 0638308                             | A 15-02-1995     | US 6017546 A            |  | 25-01-2000       |
|  |                  | CA 2126813 A            |  | 07-01-1995       |
|  |                  | DE 69423274 D           |  | 13-04-2000       |
|  |                  | DE 69423274 T           |  | 03-08-2000       |
|  |                  | ES 2147219 T            |  | 01-09-2000       |
|  |                  | JP 7069860 A            |  | 14-03-1995       |
| EP 0379677                             | A 01-08-1990     | US 5008103 A            |  | 16-04-1991       |
|  |                  | AT 125171 T             |  | 15-08-1995       |
|  |                  | AU 631164 B             |  | 19-11-1992       |
|  |                  | AU 4725289 A            |  | 19-07-1990       |
|  |                  | CA 2003748 A            |  | 23-05-1991       |
|  |                  | DE 68923545 D           |  | 24-08-1995       |
|  |                  | DE 68923545 T           |  | 15-02-1996       |
|  |                  | ES 2075030 T            |  | 01-10-1995       |
|  |                  | JP 1867588 C            |  | 26-08-1994       |
|  |                  | JP 2229539 A            |  | 12-09-1990       |
|  |                  | JP 5081292 B            |  | 12-11-1993       |
|  |                  | KR 154895 B             |  | 01-12-1998       |
|  |                  | US 5066756 A            |  | 19-11-1991       |
| US 5534246                             | A 09-07-1996     | AU 709578 B             |  | 02-09-1999       |
|  |                  | AU 3631495 A            |  | 22-03-1996       |
|  |                  | CA 2198227 A            |  | 07-03-1996       |
|  |                  | EP 0778766 A            |  | 18-06-1997       |
|  |                  | NZ 293788 A             |  | 25-02-1999       |
|  |                  | WO 9606594 A            |  | 07-03-1996       |
|  |                  | ZA 9507233 A            |  | 07-05-1996       |
| US 4311695                             | A 19-01-1982     | AU 529303 B             |  | 02-06-1983       |
|  |                  | AU 5602980 A            |  | 11-06-1981       |
|  |                  | BE 882409 A             |  | 25-09-1980       |
|  |                  | BR 8007913 A            |  | 16-06-1981       |
|  |                  | CA 1132909 A            |  | 05-10-1982       |
|  |                  | DE 3008827 B            |  | 02-07-1981       |

# INTERNATIONAL SEARCH REPORT

## Information on patent family members

Internat'l Application No

PCT/EP 00/05109

| Patent document cited in search report | Publication date | Patent family member(s) |              | Publication date |
|--|------------------|-------------------------|--------------|------------------|
| US 4311695 A                           |                  | FR                      | 2470597 A    | 12-06-1981       |
|  |                  | GB                      | 2065687 A, B | 01-07-1981       |
|  |                  | IT                      | 1140986 B    | 10-10-1986       |
|  |                  | JP                      | 1645075 C    | 28-02-1992       |
|  |                  | JP                      | 56079614 A   | 30-06-1981       |
|  |                  | JP                      | 62059681 B   | 12-12-1987       |
|  |                  | MX                      | 153294 A     | 11-09-1986       |
|  |                  | NL                      | 8001347 A    | 01-07-1981       |
| EP 0595683 A                           | 04-05-1994       | FR                      | 2696931 A    | 22-04-1994       |
|  |                  | AT                      | 152604 T     | 15-05-1997       |
|  |                  | CA                      | 2108912 A    | 22-04-1994       |
|  |                  | DE                      | 69310477 D   | 12-06-1997       |
|  |                  | DE                      | 69310477 T   | 21-08-1997       |
|  |                  | ES                      | 2101266 T    | 01-07-1997       |
|  |                  | JP                      | 6233928 A    | 23-08-1994       |
|  |                  | US                      | 5851539 A    | 22-12-1998       |
| US 5656280 A                           | 12-08-1997       | CA                      | 2161762 A    | 07-06-1996       |
|  |                  | CN                      | 1131014 A    | 18-09-1996       |
|  |                  | EP                      | 0715842 A    | 12-06-1996       |
|  |                  | FI                      | 955865 A     | 07-06-1996       |
|  |                  | NO                      | 954915 A     | 07-06-1996       |
|  |                  | NZ                      | 280600 A     | 27-07-1997       |
|  |                  | US                      | 5942216 A    | 24-08-1999       |
|  |                  | ZA                      | 9510064 A    | 05-06-1996       |

THIS PAGE BLANK (USPTO)